 https://doi.org/10.22201/fc.25942158e.2025.2.1211

PREDATION OF THE RED-EYED TREEFROG *AGALYCHNIS CALLIDRYAS* (ANURA: HYLIDAE) BY THE CENTRAL AMERICAN BULLFROG *LEPTODACTYLUS SAVAGEI* (ANURA: LEPTODACTYLIDAE), COSTA RICA

DEPREDACIÓN DE LA RANITA ARBORÍCOLA DE OJOS ROJOS *AGALYCHNIS CALLIDRYAS* (ANURA: HYLIDAE) POR LA RANA TORO CENTROAMERICANA *LEPTODACTYLUS SAVAGEI* (ANURA: LEPTODACTYLIDAE), COSTA RICA

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Received: 2024-11-22. **Accepted:** : 2025-02-19. **Published:** 2025-06-02.
Editor: Jorge E. Morales Mavil, México.

Resumen.– Reportamos el primer evento de depredación de la Ranita Arborícola de Ojos Rojos *Agalychnis callidryas* por la Rana Toro Centroamericana *Leptodactylus savagei* en Costa Rica. Aunque ambas especies habitan ambientes similares, el uso del hábitat y los microambientes difieren, y también hay segregación espacial. Por lo tanto, este podría ser un evento oportunista y posiblemente relacionado con la temporada reproductiva de *A. callidryas*. Esta nota aporta al conocimiento de la depredación, la dieta y las interacciones de ambas especies.

Palabras clave.– Anfibio, comportamiento, depredador, dieta, ecología

Abstract.– We report the first event of predation of the Red-eyed Treefrog *Agalychnis callidryas* by the Central American Bullfrog *Leptodactylus savagei* in Costa Rica. Although both species inhabit similar environments, the habitat use and microenvironments differ, and there is also spatial segregation. Therefore, this could be an opportunistic event and possibly related to the breeding season of *A. callidryas*. This note adds to the knowledge of the predation, diet and interactions of both species.

Keywords.– Amphibian, behavior, diet, ecology, predator.

The Red-eyed Treefrog *Agalychnis callidryas* (Cope, 1862) is a nocturnal and arboreal species that inhabits lowland and foothills moist and rainy forests (including forests with an undisturbed canopy, mangroves and altered habitats), from northeastern Honduras and eastern Nicaragua to eastern Panama and northern Colombia, from near sea level to 1,325 m.a.s.l. (Leenders, 2001, 2016; Savage, 2002; Frost, 2024). These frogs are preyed on by a wide range of predators, according to the development stage. Eggs are consumed by the insects *Cophipora brevirostris*, *Hirtodrosophila batracida* and *Polybia rejecta* (Warkentin 1995, 2000; Warkentin et al., 2001; Walter-Conrado et al., 2023), the snakes *Imantodes inornatus* and *Leptodeira septentrionalis* (Warkentin 1995; Savage, 2002), and monkeys (Warkentin 2000). Tadpoles may be eaten by the shrimp *Macrobrachium americanum* (Warkentin 1995), the insect *Belostoma* sp. (Vonesh & Warkentin, 2006) and the fish *Brachyraphis rhabdophora* (Warkentin 1995). Newly metamorphosed froglets may be hunted by the spider *Thaumasia* sp. (Vonesh & Warkentin, 2006). While juveniles and adults are preyed on by the snake *L. septentrionalis* (Warkentin 1995; Henderson, 2010; Brown, 2020), birds (Leenders, 2001; Henderson, 2010) and the mammals *Trachops cirrhosus*, *Potos flavus* and *Nasua narica* (Leenders 2001; Henderson, 2010).

The Central American Bullfrog *Leptodactylus savagei* (Heyer, 2005) is a nocturnal and terrestrial species that occurs in lowland and foothill moist and rainy forests (including primary and secondary forests, forest edges, and deforested areas), from Honduras to northern Colombia, from near sea level to 1,200 m.a.s.l. (Savage, 2002; Heyer, 2005; Leenders, 2016). Its diet is wide and depends on the development stage. Larvae prey on the tadpoles and eggs of other species (e.g., *Rhinella marina*, *Smilisca phaeota*, *Engystomops pustulosus* and *Boana rosenbergi*) as well as

their own, although they can also be entirely herbivore (Vinton, 1951; Heyer, et al. 1975; Muedeking & Heyer, 1976; Savage, 2002; Leenders, 2016). Adults prey on invertebrates such as insects, crustaceans, chilopods, diplopods, arachnids, and gastropods (Barquero Rodríguez, 1994; Leenders 2001, 2016), dendrobatids, and *Leptodactylus* sp., *E. pustulosus* (Barquero Rodríguez, 1994; Leenders 2001, 2016), snakes and lizards (Savage, 2002; Leenders 2001, 2016), birds and the rat *Mus* sp. and bats (Barquero Rodríguez, 1994; Savage, 2002; Leenders, 2016). Here, we document the first event of predation of *A. callidryas* by *L. savagei* in Costa Rica.

On 22 October 2024 at 20:26 h, at Tirimbina Biological Reserve, La Virgen, Sarapiquí, Heredia, Costa Rica (10.412° N, 84.121° W; 170 m.a.s.l.), the second author observed an adult *L. savagei*, preying on an adult *A. callidryas*, in the Theobroma Trail. She was walking on the trail when she heard a sound in the water. At that moment, she shone the spotlight and noticed that the bullfrog was swallowing a red-eyed treefrog (only the legs were visible). Eventually, the bullfrog swallowed the frog whole. The entire event lasted at least 5 minutes (Fig. 1).

Figura 1. *Leptodactylus savagei* depredando a *Agalychnis callidryas*, Reserva Biológica Tirimbina, Costa Rica, 22 de octubre, 2024. Foto: Charlyn Elizondo Montano.

Figure 1. *Leptodactylus savage* preying on *Agalychnis callidryas*, Tirimbina Biological Reserve, Costa Rica, October 22, 2024. Photo: Charlyn Elizondo Montano.

Adult Red-eyed Treefrogs are preyed upon by various animals, including reptiles, birds and mammals (Warkentin, 1995; Leenders, 2001; Henderson, 2010; Brown, 2020). To avoid being preyed upon, they, like other phyllomedusines, have developed several antipredator strategies, such as toxic secretions, aposematic coloration, and contracting defensive behavior (Davis et al., 2016). In contrast, bullfrogs are opportunistic and voracious predators, hunting anything small enough to eat, even poisonous frogs (Leenders, 2001; Savage, 2002; Leenders, 2016). Since the entire predation event was not recorded, it is impossible to determine the predation strategy used by the bullfrog. However, this could have been an opportunistic event in which the bullfrog took advantage of the situation to prey upon the red-eyed tree frog, which could not effectively use its antipredator strategies. To our knowledge, this is the first reported instance of *A. callidryas* being preyed upon by another amphibian, *L. savagei*.

Predatory interactions are more likely when predators and prey inhabit similar environments and exhibit comparable behaviors (Villegas, 2020; Villegas-Retana & Fernández Sánchez, 2024). This seems logical, given that both species are nocturnal, inhabit lowland and foothill rainforests, and are found at similar altitudes in Costa Rica (Leenders, 2001, 2016; Savage, 2002). However, the habitat use and microenvironments differ, and there is also spatial segregation. Therefore, we hypothesize that this encounter was an opportunistic event, and it is possible that it is related to the breeding season of *A. callidryas* (June to November), when pairs descend to the margins of ponds and remain there for several minutes (Savage, 2002; Leenders, 2016). Thus, the bullfrog could take advantage of this.

Studying predation is a key step to understand the ecology, ethology, and natural history of the species (Curio, 2012; Villegas-Retana & Picado-Masís, 2021; Villegas-Retana & Fernández Sánchez, 2024). This note adds to the knowledge of the predation, diet and interactions of *A. callidryas* and *L. savagei*.

Acknowledgements.– We thank the two anonymous reviewers for recommendations that improved the manuscript.

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